Three Phase, 4-Pole Foot-Mounted IE2 SCI Motors

Instruction & Operating Manual

Taro™ Pumps

Texmo Industries
Est. 1956

OMIM001A

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1. Introduction

Thank you for choosing a quality product manufactured by Texmo Industries. We request you to read this manual carefully to ensure that the system you have purchased will be operated correctly.

This manual is intended to provide you with information on your product and information on installation and operation. You will also find information on how you could contact Texmo Industries, should you need further information or help and support.

2. Warranty information

Please refer to your warranty card or visit **www.taropumps.com** for more information on your warranty.

3. Complying with standards

This product complies with International Efficiency Norms IE2. These motors conform to Indian standard

IS 12615: 2018	Line Operated Three Phase A.C. Motors (IE CODE) "Efficiency Classes and Performance Specification"
IS 1231:	Dimensions of Three Phase Foot Mounted Induction Motors
IS 3043:	Code of practice for earthing
IS/IEC 60034:	PART 1: Rotating electrical machines: Rating and performance
IS/IEC 60034:	PART 8: Rotating electrical machines: Terminal markings and direction of rotation
IS 15999:	PART 2 / Sec 1: Rotating Electrical Machines: Method of tests / standard methods for determining losses and efficiency from tests

IS/IEC 60034: PART 5 : Rotating electrical Machines: Degree of protection provided by the integral design of rotating electrical machines (IP CODE) – Classification

IS 7816: Guide for testing insulation resistance of rotation machines

4. Contents of the packing box

Based on the model you have purchased, your Three Phase Motor is packed along with the instruction manual and warranty card in either a corrugated box or in a wooden crate.

5. Information about your motor

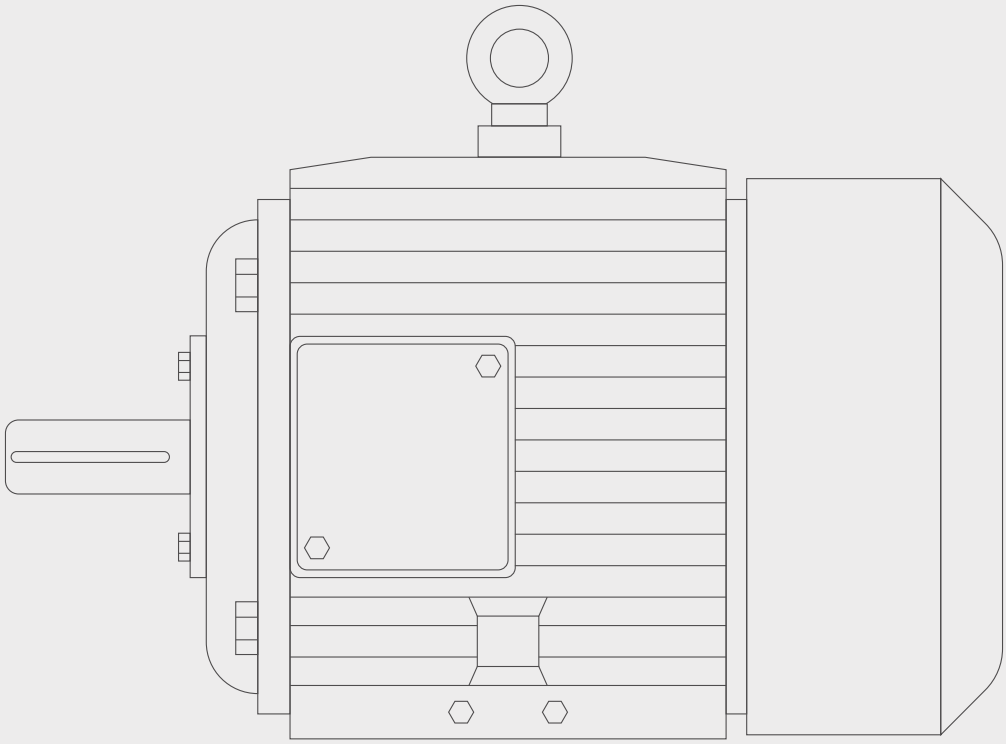
Taro Three Phase, Foot-mounted IE2 Squirrel-cage Induction Motors are manufactured using high quality raw materials and components using state-of-the-art manufacturing facilities and will give trouble-free performance if properly installed and maintained. Such motors find wide application for driving compressors, blowers, pumps, domestic flour mills, machine tools, agriculture, industrial and farm machinery, etc.

Prior to installation, go through this manual thoroughly and follow the instructions for installation and maintenance of our motor so as to ensure reliable operation. The motor should be installed by technically qualified personnel in compliance with national and local electrical codes and as per our instructions in order to avoid electrical shocks, unsatisfactory performance and equipment failure.

6. Schematic drawing

View of Three Phase, 4 Pole Foot-Mounted IE2 SCI Motors is shown below in Fig.1:

Fig. 1 View of Three Phase, 4 Pole Foot-Mounted IE2 SCI Motor



7. Key specifications & features

Standard specifications of Three Phase 4P Foot-mounted IE2 SCI Motor are shown below in TABLE 1:

Phase	Three
Motor type	Squirrel-cage induction motor – Foot mounted
Power	1 - 25 HP
Operating voltage	380 - 440 V
Starting method	DOL - upto 3 HP
	SD – above 3 HP
Frequency	50 Hz
Speed	1440 rpm
Duty	S1 continuous
Insulation class	F
Type of enclosure	TEFC

Product performance specification

Texmo Industries has a wide variety of Three Phase, 4 Pole Foot-mounted IE2 SCI Motors to meet your requirements. Please consult our sales team / your nearest dealer to meet your specific needs.

Key features: Motor

- The motor houses shielded type deep groove ball bearings, pre-filled with grease, to take up external radial and axial thrust loads
- The rotors are dynamically balanced
- Adequate motor surface area is provided for effective cooling
- Silicon steel stampings
- All motors are constructed with Class F insulation (temperature rise is limited to Class B)

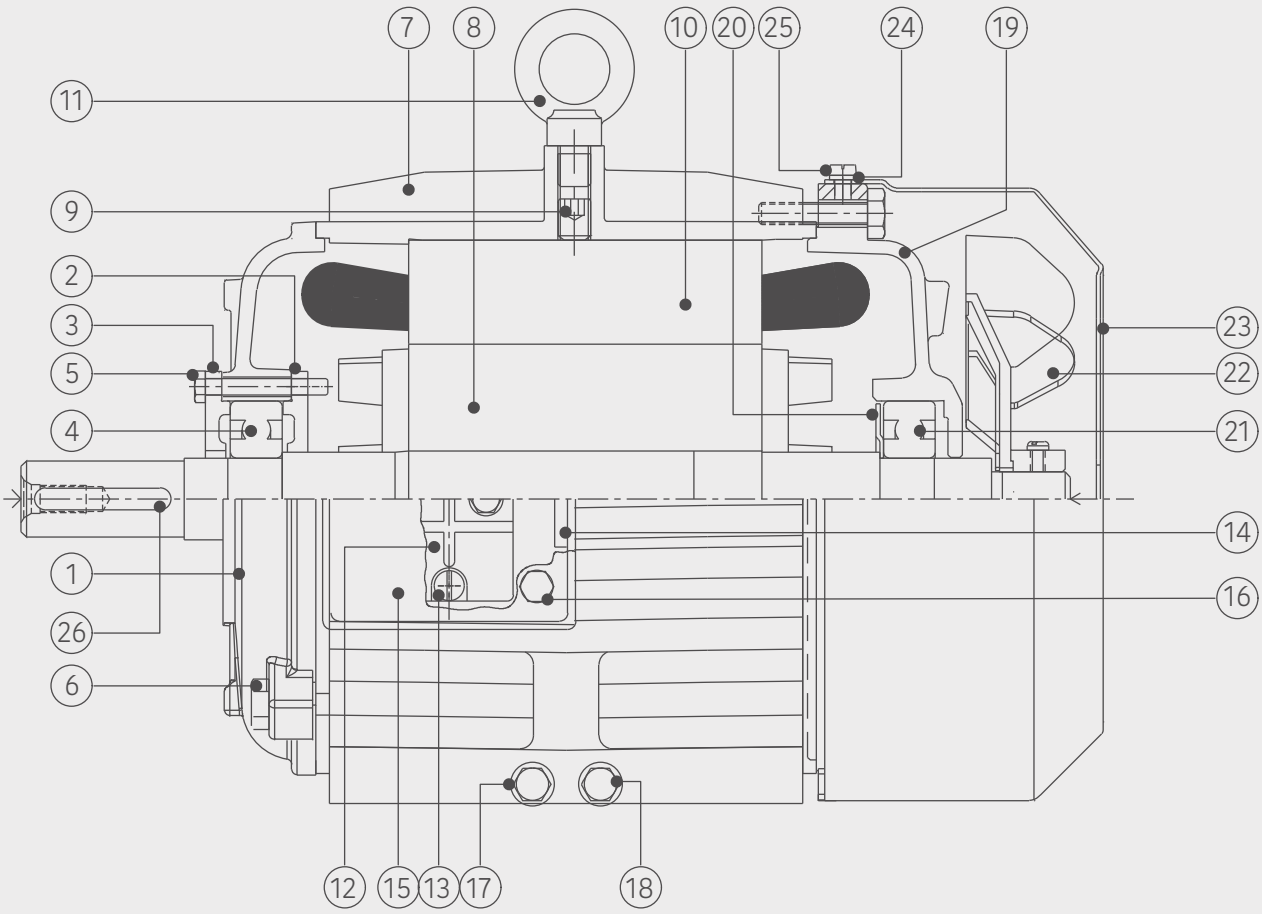
Electrical connection

- The motors are internally wired and pre-connected to the terminal board
- Connect the Three-Phase wires from the starter to the terminal board

8. Cross-section view

Cross-section view of a Three phase 4P Flange-mounted SCI Motor is shown below in Fig. 2:

Fig. 2 Cross-section view of Three phase 4P Flange-mounted SCI Motor



No.	PART NAME
1	Front Cover
2	Cap
3	Cap
4	Deep Groove Ball Bearing
5	Hexagon Head Bolt
6	Hexagon Head Bolt
7	Body
8	Rotor with Shaft
9	Hexagon Socket Set Screw

No.	PART NAME
10	Stator Stack
11	Eye Bolt
12	Terminal Board
13	C.H.Screw
14	Terminal Box
15	Terminal Box Cover
16	Hexagon Head Bolt
17	Hexagon Head Bolt
18	Washer

No.	PART NAME
19	Rear Cover
20	Shield
21	Deep Groove Ball Bearing
22	Fan
23	Fan Shield
24	Spring Washer
25	C.H. Screw
26	Parallel Key

9. Pre-installation requirements

Arrangement for Installation

- Use the services of a professional and trained mechanic with experience in erecting Three Phase Foot-mounted SCI motors
- Ensure proper safety during installation

General Installation Precautions

- Open the packaging and note down the serial number and model for future reference
- Ensure all fasteners are tightened properly
- As the motor is air cooled, ensure that air flow to the cooling fan, located at the rear side of the motor, is not blocked
- Use a single power cable from the power source to the motor. Do not use a power cable with Large number of joints as this can result in a significant voltage drop
- While installing the motor, ensure the motor is not subject to shock loads which can damage the motor parts

 Note	If you detect damage or discrepancy in the product, contact the dealer from whom the motor was purchased
 Warning	Do not use this motor in a dusty and damp environment
 Caution	Use trained professionals to install the motor

 Warning	Use a power supply cable that has sufficient rating. Factor in low voltage operation
 Warning	Provide proper earthing. Improper earthing can cause electrical shock
 Caution	Use a megger to verify the insulation resistance of the motor. Insulation resistance should be 20MΩ minimum

Operation Precautions

 Warning	Switch OFF the power before working on electrical lines
 Caution	Do not use this motor in a very hot environment as this may lead to product failure
 Warning	If any electrical leakage occurs, this could be fatal. Earth the motor

10. Installation procedure

Please follow the below procedure to install the motor.

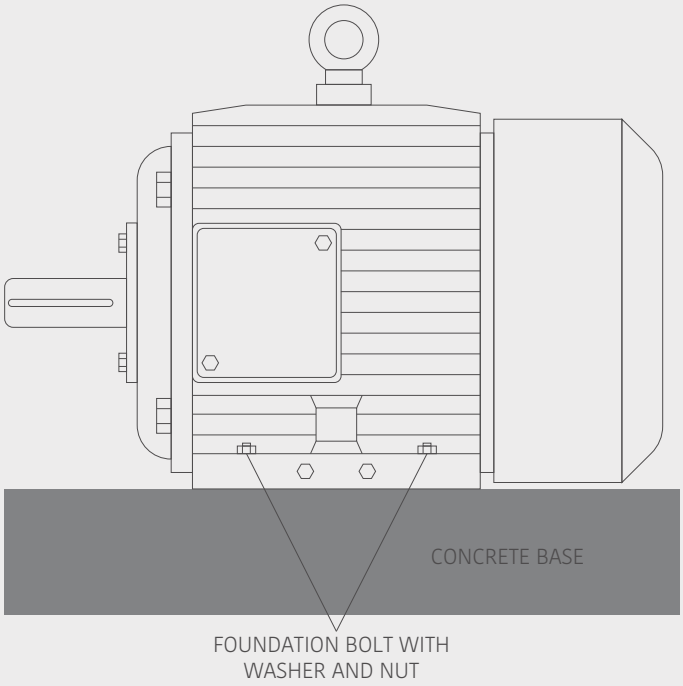
 Caution	The supply voltage should be within the specified voltage range. Failure to observe the precautions given above could cause the motor to malfunction and may lead to current leakage or electrical shock
 Warning	If you find any abnormalities like vibration, noise, smell, etc. from the motor during trial operation, switch OFF the motor and contact the dealer from whom this motor was purchased

Installation:

The following steps are executed prior to installation

- ✔ Measure the insulation resistance using a Megger of 500 VDC
- ✔ Ensure contact points are clean
- ✔ Connect the measuring cable to the ground conductor
- ✔ Connect the other measuring cable to phase terminal
- ✔ Ensure that the insulation resistance, as shown on the megger, is a minimum of 20MΩ
- ✔ Obtain the foundation details from the dealer from whom the motor was purchased. Prepare a level, concrete foundation for mounting the motor and tighten the motor base using the foundation bolts as shown in Fig 3. Below

Fig.3 Three Phase 4 Pole Foot-Mounted IE2 SCI Motors on a concrete foundation - installation



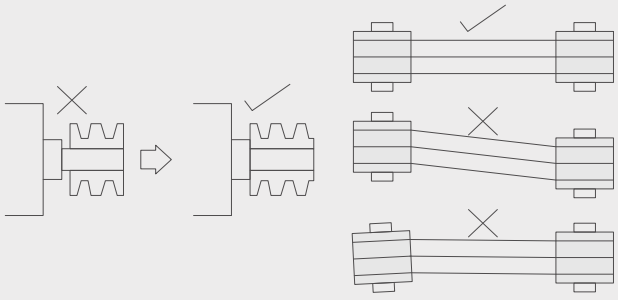
Pulley positioning, alignment and belt tensioning

It is essential to ensure the motor has an adequate degree of protection from dust, fumes and water. Ensure that the motor has no obstruction around it as this can reduce the free circulation of cooling air. For direct drive, use a flexible coupling between the driver and driven. For belt drives, the motor pulley and driven pulley must be properly aligned. The driver and driven shafts must be parallel to each other. The belt should not be overly stretched or tensioned. To assemble the pulley on the motor shaft, insert the pulley halfway up the keyway manually. Intense hammering should be avoided during fitting of pulley as this process can result in damage to the ball bearing raceways over a period of time.

Refer Fig.4 for pulley positioning and alignment.

Fig. 4 Pulley positioning and alignment

Belt tension is provided by adjusting the centre distance between the motor and driven. If the belt tension is slack, the belt can slip. If the belt tension is too high, the bearings can get overloaded leading to premature failure.



Electrical Installation

- Check the power supply voltage and frequency and compare with the product requirements specified on the name plate
- Observe relevant EB regulations while giving power supply to the motor
- As far as possible, do not use multiple joints in the electrical cabling while connecting the starter to the motor
- Ground the motor
- Ensure electrical joints, if any, are properly and adequately insulated
- Connect the cable properly to a starter
- Factor in low-voltage operation while selecting cable size

Electrical wiring work

Warning

All electrical work must be performed by an authorised electrician in compliance with local electrical equipment standards and internal wiring codes. Improper wiring can lead to current leakage, electrical shock, or fire.

Earthing

Warning

Be sure to install the ground wire securely. Failure to observe this precaution could damage the motor and cause current leakage, which may cause electrical shock.

Caution

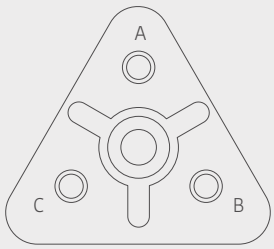
Do not connect the ground wire to a gas pipe, water pipe, lightning rod, or telephone ground wire. Improper grounding could cause electrical shock.

Connecting the Power Supply

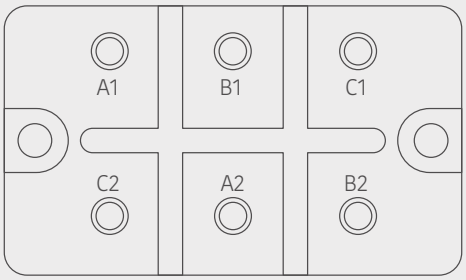
Caution	Observe relevant electricity board regulations while powering up the motor
Warning	Before connecting the wires to the terminal board, make sure the power supply is properly disconnected. Failure to do so may lead to electrical shock, short, or injury caused by the unintended starting of the motor
Caution	Do not use damaged cables, power plugs, or loose power outlets. Failure to observe this precaution could lead to electrical shock, short circuit or fire

Power cable connection to Three phase 4P Foot-mounted IE2 SCI Motor

Connect the cable from the starter to the terminal board on the foot mounted motor as shown below in Fig.5



DOL Connection



Star-Delta Connection

Checking direction of rotation of Three phase 4P foot mounted IE2 SCI Motor

Danger

Hazardous voltage will cause death, serious injury, electrocution. All electrical work must be performed by an authorised electrician, in compliance with local electrical equipment standards and internal wiring codes.

All the motors are capable of rotation in either direction. To reverse the direction of rotation, interchange any 2-phase connection. Before the motor is coupled to the load, determine proper direction of rotation. All TEFC motor cooling is affected by self-driven, bidirectional, centrifugal fan, which is protected by a fan cover. Hence, cooling effect is common for either direction of rotation.

11. Basic troubleshooting

Warning

To prevent serious accidents, disconnect the power supply before inspecting the motor.

Read this operation manual carefully before requesting repair. Contact the dealer where this equipment was purchased. Servicing and troubleshooting must be handled by qualified persons with proper tools and equipment. Common faults, root cause for these and suggested actions are provided in TABLE 2 below:

Fault	**Possible causes**	**Suggested actions**
Motor not starting	No power supply to the motor	Check for availability of power
	Motor coil burnt	Rewind the motor
	Low-voltage operation	Operate in the recommended voltage range
	OLR is tripped in starter	Reset the motor starter overload. If it trips again, check the voltage
	The ELCB has tripped out	Reset the ELCB, If it trips again, check the insulation resistance of the motor
	Fuse has blown	Replace fuse
	Loose connections	Tighten the electrical connections
	Motor shaft has sheared	Replace the assembly rotor
Motor drawing excessive current	Low-voltage operation	Check and wait for voltage to increase. Contact local EB representative if required
	Motor overloaded	Reduce the load
	Misalignment between motor drive and driven	Align motor and load
	Motor belt pre-tension excessive	Reduce belt pre-tension

Fault	Possible causes	Suggested actions
Motor runs rough and noisy	Motor bearings worn out due to overload	Reduce the overload. Dismantle and replace worn out bearings
	Motor bearings worn out due to misalignment between drivers and driven	Measure misalignment and correct. Dismantle and replace worn out bearings
	Motor bearings damaged due to excessive belt tension	Reduce the belt tension.
	Rotor shaft is bent resulting in rotor rubbing against stator bore	Replace rotor shaft. Grout the motor
	Motor not grouted	Grout the motor
	Insufficient lubrication in bearings	Replace the bearings

 Note	Conduct trial operation after maintenance
 Note	Dispose replaced components with appropriate care so as to protect the environment
 Warning	Do not try to solve unspecified troubles of motor as it may lead to severe damage to the motor or injury to personnel. Contact the dealer from whom the motor was purchased

12. Preventive maintenance checks

Precautions to be taken

 Warning	Disconnect the power supply before starting maintenance or inspection of the motor to avoid electrical shock
 Note	If you find any damages or abnormalities, switch OFF the motor and report the problem to the dealer from whom the set was purchased

NOTE: The manufacturer assumes no responsibility for damage or injury due to disassembly in the field.

A definite schedule of preventive maintenance inspections should be established to avoid breakdown, serious damage and extensive downtime. The schedule will depend on operating conditions and experience with similar equipment. Below check list does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of motor.

 Warning	Utilise the services of an electrician to carry out electrical measurements / checking the functioning of the starter

It is good practice to monitor the conditions and performance of the motor. Diagnosis may be carried out by checking the following:

- Checking the current drawn by the motor at no load conditions and compare with the data recorded when the unit was initially installed
- Any increase in motor current at no load conditions indicates a possible overload condition
- Measure the insulation resistance of the winding to check the condition of the motor
- Check the alignment between motor and driven

13. Do’s and don’ts

Do’s	Don’ts
Use a flexible coupling to connect to the drive	Do not overload the motor. Ensure that the current does not exceed that mentioned on the name plate
Align the motor and drive shaft	Do not restrict the space behind the cooling cover as this will obstruct the flow of air required for cooling of the motor
Rotate the shaft to ensure that motor is not jammed	Do not cover the product as this will prevent effective cooling of the motor
Ensure proper earthing is provided	Do not use undersized electric cables between motor and power source. Factor in low-voltage usage
Mount the motor on a level foundation and bolt down the motor	Do not use undersized electric cables between motor and Starter Panel. Factor in low-voltage usage and also Restrict the number of joints on the cable. More the cable joints, more will be the voltage drop
Check all fasteners are tight	Do not earth to a water line or gas line
Motor is IP44 protected. Provide the protection from rain	When using a belt drive, do not pre-tension the belt beyond a limit as this will overload the motor
When covering the motor to protect from water entry, provide sufficient openings for ventilation. Design the openings so that water does not enter through the openings provided	When using a belt drive, do not have over slack on the belt as the belt will slip

14. Important safety instructions

Only qualified personnel should be involved for inspection, maintenance and repairs. The successful and safe operation of such a product depends on proper handling, installation and maintenance. It is suggested that in case of non-functioning of the product, the customer is requested to contact the dealer through whom the purchase was made.

Danger

Hazardous voltage will cause death, serious injury, electrocution.
Disconnect all power before working on this equipment.
Maintenance should be performed by only qualified personnel.

15. Storage & handling

- The Three Phase 4P Foot-mounted IE2 motor is supplied from the factory in proper packaging, in which they must remain until they are to be installed
- The product should be stored in a closed, dry and well-ventilated room
- Do not store the products in direct sunlight
- Handle the motor with care and do not expose the product to unnecessary impact and shocks
- During unpacking and prior to installation, care must be taken when handling the motor to ensure that the product is not subjected to shock loads
- If the product has been stored for a very long period, check the condition of the lubrication of the bearings

 Caution	If the motors are stored, the shaft must be turned by hand at least once a month
 Caution	If the motor has been stored for more than one year before installation, dismantle the motor and check the rotating parts before use

16. Company contact information

For most up to date information on Texmo Industries, please visit www.taropumps.com

P.B.No. 5303,
Mettupalayam Road,
Coimbatore - 641 029, India

1800-102-8888
www.taropumps.com
info@taropumps.com

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Texmo Industries
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